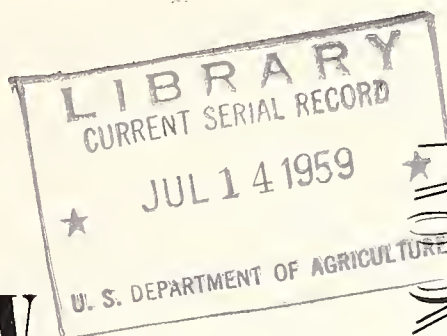


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# Inventory Management



INVENTORY

by **Selected Retail Farm Supply Co-ops**

**Area III** (*Minnesota, Wisconsin, North Dakota,  
South Dakota, and Northern Iowa*)

by **T. R. Eichers**

**Farmer Cooperative Service  
U. S. Department of Agriculture**

**General Report 50  
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FARMER COOPERATIVE SERVICE  
U. S. DEPARTMENT OF AGRICULTURE  
WASHINGTON 25, D. C.

Joseph G. Knapp, Administrator

The Farmer Cooperative Service conducts research studies and service activities of assistance to farmers in connection with cooperatives engaged in marketing farm products, purchasing farm supplies, and supplying business services. The work of the Service relates to problems of management, organization, policies, financing, merchandising, product quality, costs, efficiency, and membership.

The Service publishes the results of such studies; confers and advises with officials of farmer cooperatives; and works with educational agencies, cooperatives, and others in the dissemination of information relating to cooperative principles and practices.

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# Summary and Suggestions

Twenty local farm supply cooperatives provided information for this study. They were located in Minnesota, Wisconsin, North Dakota, South Dakota, and northern Iowa. Data were obtained by personal interviews with the local managers. The associations were about average for this area in their inventory management.

Sales of supplies by these associations in 1956 averaged about \$392,000 and ranged from \$126,968 to \$923,358. Petroleum was the major commodity sold, accounting for 67 percent of sales. Tires, batteries and accessories amounted to 10 percent, feed and seed 13 percent, fertilizer 6 percent, and other supplies 9 percent.

Average inventory of these associations was \$54,488 with a range of \$24,535 to \$160,390. Smaller associations had larger inventories in relation to sales than the larger ones. Ten associations with the largest volume had \$7.90 of sales for each dollar in inventory compared to \$5.34 in sales for each inventory dollar in the smaller associations.

Tires, batteries, and accessories amounted to 35 percent of inventory, petroleum to 29 percent, and other commodities to 36 percent. However, petroleum amounted to 67 percent of sales and tires, batteries and accessories to only 12 percent.

Inventory turnover relates inventory size to sales volume and indicates the degree of efficiency in the use of inventory capital. Annual turnovers for these associations were as follows: Total supplies, 6.1 times; petroleum, 15.3; tires, batteries and accessories, 1.6; feed and seed, 12.2; fertilizer, 4.2; and other supplies, 1.9 times.

This information can also be expressed as days' supply on hand as follows: Total supplies, 59 days; petroleum, 23.5; tires, batteries, and accessories, 22.5; feed and seed, 29.5; fertilizer, 86; and other supplies, 190 days.

Managers generally were responsible for purchasing supplies. Physical inspection of the inventory usually was the basis on which supplies were reordered.

Purchasing in carload lots and purchasing with other cooperatives were cited as methods helpful in reducing inventory costs. Buying on customer orders, consignment buying, and using cooperatives' own trucking facilities were cited as practices which aided in keeping inventories at a minimum.

Frequent physical inventories also were said to be of value in keeping inventories of certain items low and in controlling shrinkage; however, most associations took complete physical inventories only once or twice a year.

Special sales campaigns with use of quantity discounts and commissions, cardoor deliveries or selling from freight cars, and preseason sales of fertilizer and oil were very helpful in minimizing inventories. Some associations reported they did not have sufficient storage space to carry a full stock of fertilizer and oil throughout the year.

Inventories involve costs. Not only do they involve purchasing costs, but they involve costs while in storage. Interest, insurance, shrinkage, and obsolescence might easily amount to 10 percent of the inventory value. Inventory costs would therefore amount to \$560 for each 5 days' supply on



hand for an association with \$400,000 sales annually. Thus reducing inventories by only a few days' supply can result in considerable savings.

Several suggestions which may be helpful in controlling inventories follow:

1. Orderly Purchasing:

- a. Buy on a systematic basis which permits a sufficient time lag between ordering and delivery of merchandise.
- b. Permit the inventory to become relatively low before reordering, but maintain inventories sufficient for current needs. Excessive inventories result in high inventory interest costs and losses through theft, deterioration, and obsolescence.
- c. Discontinue handling "dead" merchandise.

2. Systematic Recording:

- a. Record stock carefully when it is received to be sure that what has been ordered has been delivered and to know what has been added to the inventory stock.
- b. Take physical inventories frequently to determine which items move and which do not, to determine inventory losses and deterioration, and to decide when to reorder.

3. Delegation of Responsibility:

- a. Delegate specific aspects of inventory management to the personnel in the organization.

- b. Give each individual a detailed description of the jobs he is to perform.

4. Efficient Use of Facilities:

- a. Arrange the storage area to enable the handling of stock with the least amount of work and in such a manner that it can be easily recorded, counted, found, and removed.
- b. Arrange the warehouse and display areas so that fast moving items are readily available to customers.
- c. If the operation is sufficiently large, use mechanical lifts and pallets to reduce the amount of labor required in handling stock.
- d. Use space interchangeably for different items at different seasons and thus reduce the amount of space required.

5. Awareness of Inventory Turnovers:

- a. Know what the turnover of each commodity is and how this compares with turnovers of other cooperatives or dealers selling this commodity.
- b. If the turnover is slow by comparison with others, determine the cause and attempt to improve the turnover either by reducing the average stock on hand or by increasing selling efforts.

6. Realization of Inventory Costs:

- a. Inventory costs are closely related to inventory size;

therefore keep inventory size as small as possible.

- b. The cost of carrying inventory amounts to more than 10 percent of inventory; therefore it may be wise to dispose of seasonal goods at reduced prices at the end of the season rather than to carry them into the next season.

7. Avoid Competing Lines of Merchandise:

- a. Carry as few lines of any one item as possible. Duplication of items results in excessive inventories and increased costs.
- b. Obtain supplies from your regional or wholesale cooperative whenever possible to avoid duplication.



# **INVENTORY MANAGEMENT BY SELECTED RETAIL FARM SUPPLY CO-OPS**

**(Area III-Minnesota, Wisconsin, North Dakota, South Dakota,  
and Northern Iowa)**

by T. R. Eichers  
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Inventory management is an important aspect of operating a successful retail business. This job consists essentially of three phases: (1) Obtaining inventories, (2) handling and storing inventories, and (3) distributing the inventories.

These functions should be carried out in such a way as to obtain inventories at the lowest possible cost, maintain the inventory at the smallest adequate size, minimize handling costs and storage losses, and dispose of this inventory as rapidly and economically as possible.

## **Purpose and Method of Study**

This study was the third in a series on inventory management in farm supply cooperatives conducted by Farmer Cooperative Service. The purpose of this one was to:

1. Determine purchasing policies and practices that affect inventory acquisition.
2. Determine successful practices for storing and handling inventories.
3. Determine sales policies and practices which affect inventory turnover.
4. Recommend useful policies and practices for efficient inventory management.

This study included inventory operations of 20 local farm supply cooperatives during fiscal year 1956. The area covered is designated as Area III and is composed of the States of Minnesota, Wisconsin, North Dakota, South Dakota, and northern Iowa.

The associations covered also were used in a credit study for this area because their control of credit was better than average. Since data were not available for selecting outstanding associations in inventory management in this area, these associations were used on the assumption that if their credit operations were better than average, their inventory operations might also be above average.

Actually the 20 cooperatives selected were found to be about

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Note: The author expresses appreciation to officials of the farmer cooperatives who provided information on their inventory operations, and to J. Warren Mather and John M. Bailey, Farm Supplies Branch, Farmer Cooperative Service, for their assistance in planning and developing this study.

average for this area in their inventory management. They had a turnover of 6.6 times compared to

5 times for 41 farm supply associations and 7.4 times for 149 oil associations in this area during 1956.

## Volume and Type of Supplies Distributed

The average sales volume of the 20 associations in this study was \$392,310. Petroleum was the chief commodity handled, averaging 67 percent of sales in 17 associations which reported this commodity (table 1).

In 17 associations, tires, batteries and accessories amounted to 12 percent of sales. In 5 associations which carried feed and seed these items amounted to 35 percent of their sales. In 11 associations, fertilizer amounted to 6 percent of total sales.

Other items such as farm machinery, building supplies, and household goods amounted to about 12 percent of sales. These totals exceed 100 per-

cent because the proportion of each commodity is calculated only for those associations which reported sales of the specified commodity.

The proportions of various supply items handled also were analyzed on the basis of total volume of the associations. Half had supply sales under \$375,000 and half exceeded this amount in 1956. Petroleum amounted to two-thirds of sales in both groups of associations (table 1). However, in the smaller associations, tires, batteries, and accessories amounted to 18 percent of sales compared with 7 percent in the larger associations. The proportion of sales represented by other commodities was nearly the same in both groups.

Table 1.--Proportion of farm supply commodities sold by selected cooperatives,<sup>1</sup> grouped by small and large volume, 1956<sup>2</sup>

Commodity	Associations			Associations with total supply volume of <sup>3</sup>			
	Average		Range	Less than \$375,000		More than \$375,000	
	<i>Number handling</i>	<i>Percent</i>	<i>Percent</i>	<i>Number handling</i>	<i>Percent</i>	<i>Number handling</i>	<i>Percent</i>
Petroleum	17	67	29 to 89	8	66	9	67
Tires, batteries, and accessories	17	12	2 to 26	8	18	9	7
Feed and seed	5	35	30 to 45	2	31	3	38
Fertilizer	11	6	1 to 9	6	7	5	5
Other	17	12	3 to 34	7	11	10	12

<sup>1</sup> Twenty farm supply cooperatives in Minnesota, Wisconsin, North Dakota, South Dakota, and Iowa.

<sup>2</sup> Average percentages do not add to 100 because they are based only on those associations reporting volumes for each commodity.

<sup>3</sup> Average volume of all associations was \$392,310. Average volume for the lower group was \$193,645 and for the higher group was \$574,175. Total sales volume ranged from \$126,968 to \$923,358.



# Acquiring Inventories

The first problem in inventory management is wise acquisition of a stock of goods. What supplies should be obtained? Where should they be purchased? How frequently should purchase be made? How are the goods to be delivered to the cooperative? Should supplies be bought at long intervals in large lots to obtain quantity discounts, or more frequently in smaller amounts to keep inventories low? Should merchandise be transported by truck or railroad, or should the cooperative maintain its own trucking facilities? These are all questions which must be answered by management in acquiring inventories.

Some of the purchasing practices used by managers in the area studied are discussed in this section of the report.

## Responsibility for Purchasing

Responsibility for purchasing supplies rested almost entirely with the managers. In 18 cooperatives the manager alone purchased supplies, department heads purchased supplies with the manager's approval in 3, and in 1 the job of purchasing was completely delegated to department heads.

Among the most significant factors in deciding on new lines of supplies to handle were (1) the managers' advice, (2) the board of directors' advice, and (3) patrons' requests. Fifteen associations indicated that all three of these factors were important. Twenty associations indicated that one or more was important in deciding on new lines to handle.

Other factors mentioned as important in deciding on new lines were (1) advice from the wholesale, (2) advice from department heads, (3) sur-

veys of members, and (4) agricultural college recommendations.

Two-thirds of the cooperatives relied solely on visual inspection of the inventory in deciding when to re-order regular inventory items. Most of the others used this method more than any other. Because of a relatively small business volume they felt that it was quite adequate. Other methods used to some extent were perpetual inventories, check lists, and want books. Perpetual inventories were used mostly for machinery parts.

## Procurement Methods

Procurement methods used to keep inventory costs per unit at a minimum were (1) purchasing in carload lots and (2) purchasing with other cooperatives.

Nearly all associations bought some goods in carload lots. Five bought petroleum, 6 purchased steel, 8 obtained fertilizer, 9 bought oil and grease, 7 bought feed, and 1 purchased appliances in this manner. Purchasing in large lots enables the buyer to get goods at a discount, but it requires a large amount of storage space and results in a slower turnover. Fourteen associations bought some supplies with other nearby cooperatives.

Procurement methods employed to keep inventory size at a minimum were as follows:

1. Buying on consignment. Four associations bought fertilizer and two bought tires in this way.
2. Buying on customer orders. Thirteen associations bought some supplies in this manner, usually farm machinery and appliances.

In evaluating these four purchasing practices, 11 associations said buying in carloads substantially helped in reducing inventory costs but indicated that this practice did not improve inventory turnover or decrease inventory size. Three associations mentioned consignment buying as a good means of reducing the amount of capital tied up in inventory; two indicated purchasing with other cooperatives; and two reported use of their own trucking facilities helped reduce costs.

Obtaining the same type of supplies from various sources and duplicating items increased inventory size. Thus the number of suppliers bought from and the number of lines carried should be kept at a minimum.

Most of the 20 associations obtained nearly all their supplies through cooperative channels. Half of them bought all supplies from cooperative sources except from 2 to 5 percent of their accessories. The other half bought varying proportions of fertilizer, hardware, appliances, or building supplies from other sources. Only one association was not directly affiliated with any wholesale cooperative.

Most associations bought from private wholesale companies only if the cooperative wholesale didn't handle the merchandise. All the associations, therefore, said that purchasing from other companies did not affect inventory size because these purchases were not a duplication of cooperative items.

## Maintaining Stock

It is not sufficient just to obtain the inventory. It is also necessary to keep a record of the inventory to be aware of what is on hand, to avoid excessive amounts of any commodity or to prevent running out of other commodities, and to store the inventory in such a manner as to avoid inventory losses.

### Inventorying

The physical inventory is a valuable tool in inventory control. It is needed to determine (1) stock shortages, (2) which items move fast or slow, and (3) the condition of inventory stock.

The frequency with which inventories were taken by the associations studied and the supplies involved were as follows:

1. Daily inventories of some supplies were taken by 2 associations--1 on tires and batteries and 1 on petroleum.

2. Monthly inventories were taken by 11 associations on petroleum, 6 on lubricating oils, 4 on all merchandise except miscellaneous items, and 2 on tires and batteries.
3. A bimonthly inventory of all supplies was taken by one cooperative.
4. A quarterly inventory of all goods was taken by one association.
5. Semiannual inventories of all goods were taken by nine associations.
6. Annual inventories of all supplies were the practice of seven associations.

Employees took the daily inventories. Usually manager and employees jointly took monthly inventories. The board of directors, the manager, and the employees all had a hand in taking semiannual and



annual inventories. Daily and monthly inventories were generally not complete; they did not include accessories or miscellaneous stock. Quarterly, semiannual and annual inventories were complete.

Daily and monthly inventories were said to be helpful in controlling shrinkage and maintaining a good turnover. Semiannual and annual inventories served mostly to evaluate inventory for balance sheet purposes.

In pricing the inventory eight associations used cost or market value whichever was lower. Fourteen associations valued inventory at cost, and one priced feed at market value.

In 16 of 20 cooperatives, managers were solely responsible for pricing the inventory, and the office help was solely responsible for pricing in 2. The manager shared this with department heads in 1 association, department heads did it alone in 1, and the manager and office help priced the inventory in another.

Auditors checked the pricing in 6 associations, in 3 the employees assisted in pricing, and boards of directors assisted in 3 others.

## Moving Inventories

Inventories not only must be obtained and stored; they must be sold. The final goal is to distribute the inventory in a satisfactory and economical manner.

Some of the distribution methods employed by the 20 associations to aid in distributing inventories are presented in this section of the report.

The associations used special selling efforts on various commodities throughout the year. Two-thirds of them had one or more special sales campaigns each year.

## Shrinkage

Shrinkage losses of merchandise can occur through improper recording, improper handling and storing, faulty storage areas, theft, carelessness, evaporation of fuels, and in other ways.

The following practices will keep shrinkage at a minimum:

1. Record all stock carefully.
2. Keep the storage area in good condition.
3. Arrange stock to make theft more noticeable.
4. Keep inventories at a minimum to prevent obsolescence, deterioration, or spoilage. With a small inventory, missing items will be more noticeable than with large inventories.

Methods cited most frequently by the cooperatives studied as effective in minimizing shrinkage losses were frequent physical inventories, efficient employees, and proper recording of stock.

Twelve cooperatives gave quantity discounts or special price reductions, and 13 gave sales bonuses or commissions on certain items to help move them. These practices all helped improve inventory turnover and minimize size of inventories.

Amounts of supplies in inventory can be materially reduced through cardoor deliveries or selling directly from the freight car. Seven cooperatives used cardoor deliveries for fertilizer and one handled fertilizer and other supplies in this manner. Several associations indicated this was the only way they could handle

fertilizer because they had no storage space for it.

Among the 20 cooperatives, 15 used pre-season sales. Several stated that they sold a large part--as much as 50 percent in some cases--of their oil, tires and fertilizer during these sales.

Of the foregoing selling practices, seven associations rated special sales as the most effective means of minimizing inventories. Pre-season sales were considered especially effective because many cooperatives did not have the space to carry a full stock of oil and fertilizer throughout the year.

## Inventory Size

"The question before management is: How big should inventories be? The answer to this is obvious--they should be just big enough, but what is big enough?"<sup>1</sup>

Usually the problem is not in having inventories too small but rather having them too large. Managers soon discover when their stock is depleted and quickly replace it. Their attention, however, is seldom drawn to an oversupply of goods. Some managers may think that if they have the space they may as well stock up. However, excessive inventories may lead to serious losses in the following ways: (1) Capital which could be put to better use is tied up; (2) actual storage losses may occur through deterioration, theft, fire and the like; (3) speculation losses can occur through price declines; and (4) inventories may become obsolete while standing on the shelf.

### Factors Affecting Size

Maintaining inventories at the proper level is one of the most important factors in inventory control. Inventory size is determined by several factors such as (1) procurement and distribution methods, (2) seasonal variation in demands, (3) commodities handled, (4) available storage

space, (5) available capital, (6) distance from source of supply, and (7) the manager's check on inventory.

In the cooperatives studied, size of inventory was greatly affected by amount of storage space available. More than half reported storage space as limiting the amount of inventory. Feed, fertilizer, petroleum, and hardware space were cited most often as being inadequate.

Six associations attributed large inventories to distance from the supply. Inventories of cement, fertilizer, tires, batteries, and accessories were reported to be excessive because of this situation.

Generally managers stated that merchandise deliveries from the wholesale were very good and had no effect on inventory size. Two associations, however, attributed excessive inventories to transportation facilities.

The demand pattern of certain items is quite unpredictable; therefore inventories of certain items may be carried for 6 to 9 or more months before they are sold. This is especially true of farm machinery and repair parts. The demand pattern for feed and petroleum, however, is much more predictable, and a supply of these items need not be carried for such a long time.

<sup>1</sup> Magee, John F. Harvard Business Review Vol. 34 (no. 1, Jan. - Feb. 1956).



Not only is the demand pattern different for different commodities but the supply pattern also varies. Stocks of feed and petroleum can be filled almost immediately, but a considerable period of time may elapse before an order of farm machinery or building supplies is delivered. To maintain a 30-day supply of all commodities is unrealistic. The number of days of supply on hand must be based on demand for and availability of the commodity in question.

### Amounts by Commodities

In this study year-end inventories are used because only a few of the associations had monthly or seasonal inventory records. In five associations on which mid-year inventories were available, however, inventories were nearly the same at the year-end as at mid-year. At mid-year they were 105 percent of the year-end inventory (table 2). Little difference existed among items except fertilizer stocks, which were 180 percent of year-end amounts.

Inventories ranged in value from \$24,535 to \$160,390 and averaged \$54,448. The 10 associations with the largest volumes had inventories of \$72,000 or just twice as much as the 10 with the smallest volumes whose inventories averaged \$36,000. Sales of the larger associations, however, were \$574,000 or three times as large as the average sales of \$194,000 for the smaller associations.

In the 20 cooperatives petroleum amounted to 67 percent of sales, but it accounted for only 29 percent of inventories. In contrast, tires, batteries and accessories (TBA) accounted for 12 percent of sales and 35 percent of inventories (table 3 and figure 1). It does not follow, however, that the ratio of sales to inventory for petroleum was good and that for tires, batteries, and accessories was poor. Nor does it indicate that net savings on petroleum are greater than those on tires, batteries, and accessories because expenses may be more and gross margins less on petroleum.

Table 2--Mid-year inventories as a percent of year-end inventories in selected commodities in 5 farm supply associations, 1956

Commodity	Associations	Mid-year as percent of year-end inventories
	<i>Number handling</i>	<i>Percent</i>
Petroleum	4	98
Tires, batteries, and accessories	4	100
Feed and seed	4	97
Fertilizer	4	180
Other	<u>3</u>	<u>100</u>
Total	5	105

Figure 1

# Retail Sales and Year-End Inventories of Selected Commodity Groups, 1956

(20 Local Farm Supply Cooperatives in Five North Central States)

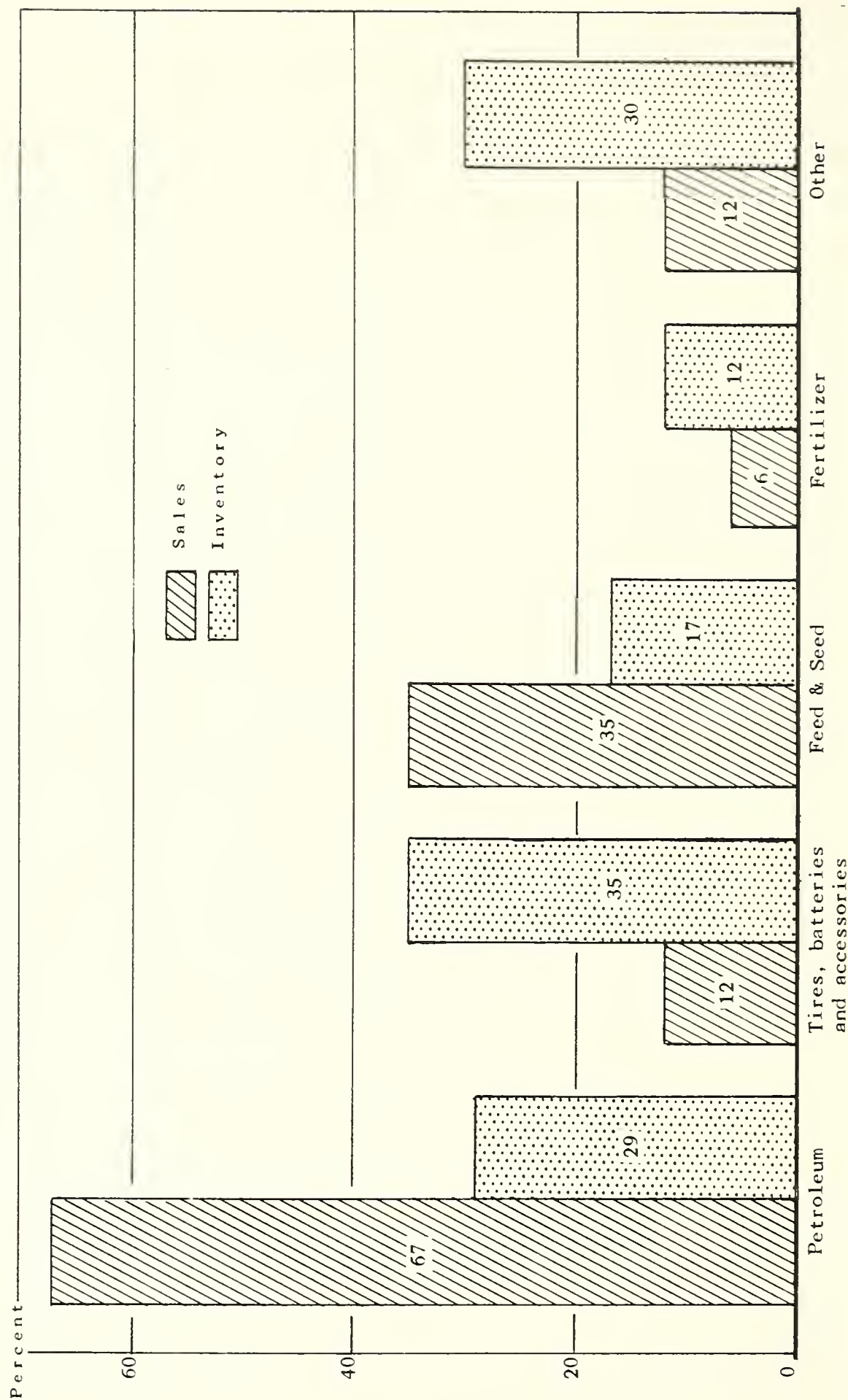


Table 3.--Proportion of farm supply inventories represented by specific commodities in selected cooperatives<sup>1</sup> grouped by large and small volume, 1956<sup>2</sup>

Commodity	Associations			Associations with total supply volume of			
	Average <sup>3</sup>		Range	Less than \$375,000		More than \$375,000	
	<i>Number handling</i>	<i>Percent</i>	<i>Percent</i>	<i>Number handling</i>	<i>Percent</i>	<i>Number handling</i>	<i>Percent</i>
Petroleum	18	29	8 to 55	9	28	9	29
Tires, batteries, and accessories	18	35	5 to 68	9	43	9	27
Feed and seed	5	17	2 to 32	2	15	3	18
Fertilizer	11	12	3 to 28	6	15	5	8
Other	17	30	3 to 67	7	16	10	40

<sup>1</sup> Twenty farm supply cooperatives in Minnesota, Wisconsin, North Dakota, South Dakota and Iowa.

<sup>2</sup> Average percentages do not add to 100 percent because they are based only on those associations reporting volumes for each commodity.

<sup>3</sup> Average inventory value of all associations was \$54,488. The average inventory value of the small volume associations was \$36,232, and average value of the large associations was \$72,743. Inventory values ranged from \$24,535 to \$160,390.

As previously stated, inventories should be just large enough. This poses a problem in deciding what is large enough. Shall the cooperative endeavor to provide perfect service? This would require considerably larger inventories than if the cooperative provides good service knowing that occasionally it may be unable to meet certain patrons' requests. The minimum inventory of course will vary with each commodity. It may be as little as 3 days

supply with petroleum or it may be as great as 2 years for farm machinery repairs. To keep inventories at an absolute minimum may require purchasing in small lots and losing quantity discounts, and paying more per unit for transportation, bookkeeping, and handling costs. The manager must determine at what point inventory costs equal the savings resulting from a large inventory. The inventory at this point is, perhaps, the amount that should be maintained.

## Inventory Turnover

An inventory turnover shows how many times a year the inventory is sold. If the rate is 12 times, the inventory turns once a month. This ratio also can be expressed in terms

of the number of days' supply in inventory. A turnover of 12 times means that 30 days' supply of merchandise is carried in stock based on 360 days a year or 25 days' sup-



ply based on 300 selling days a year. Turnover will vary greatly with the commodities sold--from 20 to 30 or more times a year with petroleum, to less than once a year with farm machinery parts.

Inventory turnover relates inventory size to business volume, and indicates how efficiently inventory capital is used. Large inventories in relation to sales usually cause greater inventory cost per unit of sales. This is true, however, only to a certain point. An extreme minimum of inventory will result in excessive "hand to mouth buying," and cause the loss of quantity discounts and possibly a loss of customers due to frequent "out of stock" items. It will also result in excessive per unit transportation, bookkeeping, and handling costs.

Inventory turnovers in this study were computed on the basis of both sales and cost of goods sold. Turnovers based on cost of goods sold present a more accurate picture because inventories generally are valued at cost. Year-end rather than average inventories were used in this study because most associations took a complete inventory only once during the year.

Turnover comparisons of total inventories are sometimes quite meaningless because the proportion of sales of different commodities varies between associations. In most of these associations, however, petroleum was the chief commodity--averaging about two-thirds of total sales. In any event this turnover may be useful for an individual association as a check over a period of time.

The average turnover of all commodities in these associations was 6.1 in 1955-56, based on cost of sales (table 4). Their total inventory turnover was about the same in 1955-56 as in 1951-52, but slightly less

than during the intervening years. This ratio was slightly better than that indicated in a summary of 41 farm supply associations in this area which had a turnover of 5 times based on cost of sales but not as good as 149 oil associations in the same area which had a turnover of 7.4 times a year.

Those associations reporting improvement in inventory turnovers the last 5 years cited an increase in sales without a corresponding increase in inventory as the factor primarily responsible. Other reasons given were better merchandise, more capable personnel, a closer watch kept on inventory, greater sales efforts, and improved agricultural conditions. In no case were inadequate inventories cited as a cause of high turnovers. Several managers stated they occasionally were out of an item but never for any length of time.

Inventory turnovers should be calculated for each commodity in order to properly manage inventories. Turnover among farm supply and equipment items varies widely. Farmers may make certain equipment purchases only once in several years; thus their day-to-day demand is difficult to forecast. As a result a stock sufficient for a long period of time usually is needed which causes a slow turnover. Petroleum purchases are made more frequently, purchases are more predictable, and inventories need not be carried for as long a time. Consequently, inventories of petroleum can be expected to turn much more rapidly than those of farm machinery.

Inventory turnover data were available for five categories of commodities in 1956 based on cost of sales and year-end inventories valued at cost (table 4). Petroleum had a turnover of 15.3 times; tires, batteries and accessories turned 1.6 times; feed and seed, 12.2 times;

Table 4.--Inventory turnover of farm supply commodities in selected cooperatives,<sup>1</sup> grouped by large and small volume, 1956<sup>2</sup>

Commodity	Associations		Associations with total farm supply volume of			
	Average	Range	Less than \$375,000	More than \$375,000		
	<i>Number handling</i>	<i>Times</i>	<i>Number handling</i>	<i>Times</i>	<i>Number handling</i>	<i>Times</i>
Petroleum	17	15.3 4.7 to 31.2	9	11.7	8	19.4
Tires, batteries, and accessories	17	1.6 1.3 to 2.9	9	1.6	8	1.7
Feed and seed	6	12.2 6.9 to 16.2	3	13.2	3	11.2
Fertilizer	11	4.2 1.8 to 7.4	6	3.8	5	4.7
Other	<u>17</u>	<u>1.9 0.5 to 4.9</u>	<u>8</u>	<u>2.1</u>	<u>9</u>	<u>1.7</u>
Total	20	6.1 3.1 to 10.7	10	5.0	10	6.9

<sup>1</sup> Twenty farm supply cooperatives in Minnesota, Wisconsin, North Dakota, South Dakota, and Iowa.

<sup>2</sup> Turnovers based on cost of goods sold and year-end inventories.

fertilizer, 4.2 times; and other commodities, 1.9 times. The latter group included building materials, farm machinery and parts, and miscellaneous supplies.

The total inventory turnover for the 20 associations in this study was 6.1 times per year; however, based on sales the turnover was 7.7 times.

If these turnover ratios were converted to days' supply of merchandise on hand, the results would be as follows: Petroleum, 23.5 days; tires, batteries, and accessories, 225; feed and seed, 29.5; fertilizer, 86; other supplies, 190; and total supplies, 59 days.

Volume had a decided effect on inventory turnover of petroleum products (table 4 and figure 2). Turnovers of petroleum, based on

cost of sales, in 8 associations with more than \$375,000 of sales was 19.4 times compared to 11.7 for 9 associations with less than \$375,000 volume. The associations with the larger volumes normally had 18.5 days' supply of petroleum on hand compared to 31 days for those with the smaller volumes.

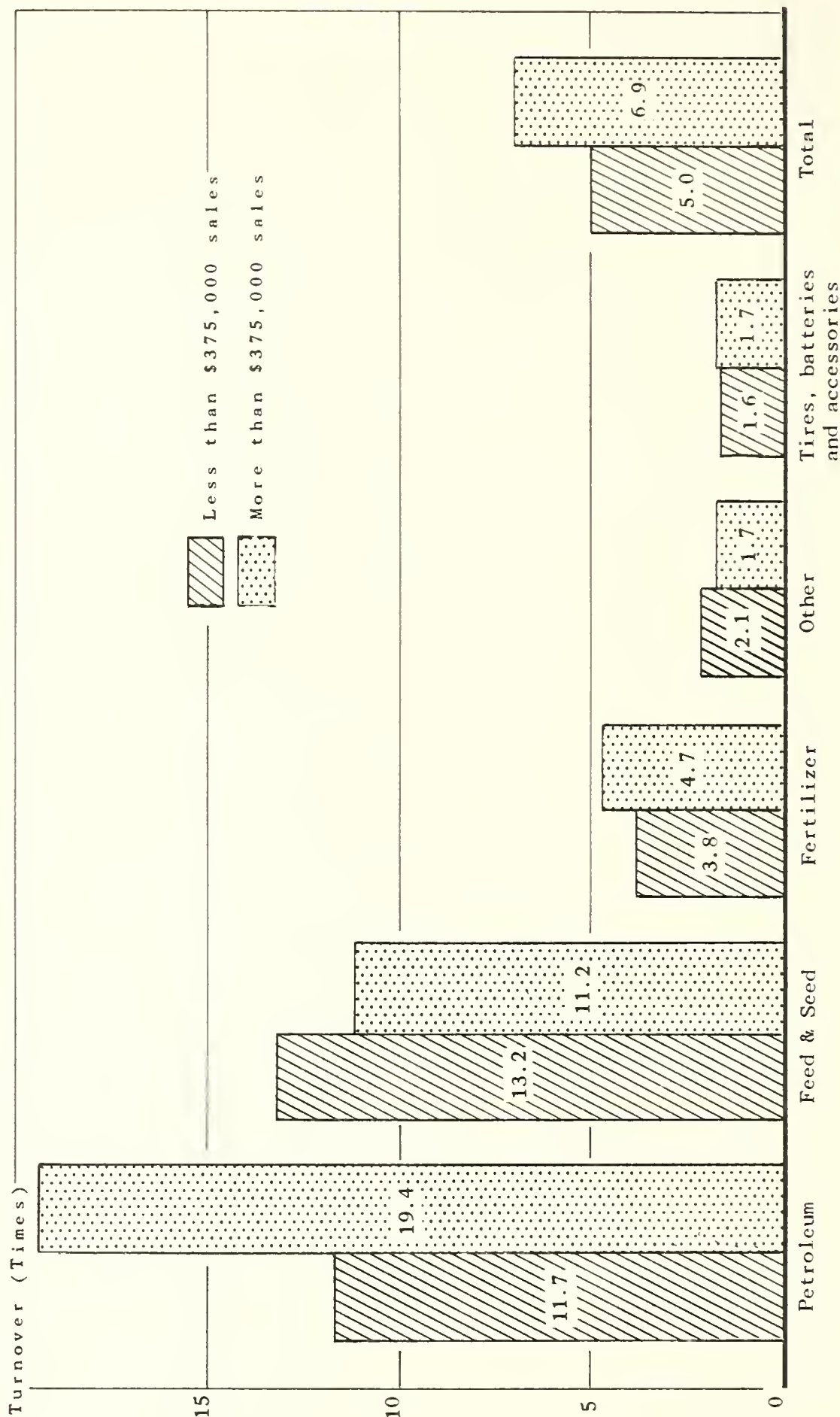
There was little difference in the turnovers of other commodities in the large and the small associations. This situation may have been due to the fact that petroleum was the major commodity in nearly all associations and the volume of other commodities was nearly the same in both the large and the small associations.

The larger associations had sales amounting to \$7.90 for each dollar invested in inventory while the smaller associations had \$5.35 of sales for each dollar in inventory.

Figure 2

# Inventory Turnover for Selected Commodity Groups, 1956

(20 Local Farm Supply Cooperatives in Five North Central States)





As mentioned previously, total sales of these associations increased about 30 percent from 1952 to 1956.

Inventories increased 28 percent; therefore turnovers remained virtually the same.

## Inventory Costs

Inventory costs are closely related to inventory size and turnover. Inventory costs include interest, insurance, shrinkage, taxes, and obsolescence. These may easily amount to 10 percent of average inventories on hand each year.

At this rate, inventory costs amount to \$140 for each 5 days' supply of inventory required for each \$100,000 of sales a year; therefore, reducing the inventory supply by only 5 days will result in yearly savings of \$140 in an association with this volume. Such costs for other volumes and turnover rates are shown in table 5.

The 20 cooperatives in this study had an average of 58 days'

supply of merchandise on hand, and an average volume of \$392,000. Therefore, their average inventory costs amounted to about \$6,350 a year.

The 10 associations with the largest volume had average sales amounting to \$574,000 and an average of 47 days' supply on hand. Inventory costs in these associations amounted to about \$7,600. The smaller associations had an average volume of \$194,000 and an average supply of 73 days, so inventory in these associations cost about \$4,100. Sales of the larger associations were more than three times as great as those of the smaller associations; inventory costs, however, were less than twice as great. This shows that

Table 5.--Estimated annual inventory costs for cooperatives with various volumes and inventory turnover rates<sup>1</sup>

Supply volume	Days' supply in inventory							
	5	10	15	20	30	60	90	180
	Inventory turnover (times per year)							
	72	36	24	18	12	6	4	2
\$100,000	\$140	\$280	\$420	\$560	\$840	\$1,680	\$2,520	\$5,040
200,000	280	560	840	1,120	1,680	3,360	5,040	10,080
300,000	420	840	1,260	1,680	2,520	5,040	7,560	15,120
400,000	560	1,120	1,680	2,240	3,360	6,720	10,080	20,160
500,000	700	1,400	2,100	2,800	4,200	8,400	12,600	25,200
1,000,000	1,400	2,800	4,200	5,600	8,400	16,800	25,200	50,400

<sup>1</sup> Cost calculated at 10 percent of average inventory value.

inventory costs were more per unit for small associations than for large ones.

Higher inventory costs and lower turnovers for smaller associations are to be expected because a mini-

mum amount of stock must be carried even though sales are considerably less than in other associations. Table 6 shows inventory costs per \$100 of sales at 10 percent a year when inventories are turned at various rates.

Table 6.--Estimated inventory costs per \$100 of sales with varying inventory turnover rates<sup>1</sup>

Inventory turnover per year	Days' supply of goods on hand	Inventory cost per \$100 sales
1	360	\$10.00
2	180	5.00
3	120	3.33
4	90	2.25
5	72	2.00
6	60	1.68
7	51	1.43
8	45	1.25
9	40	1.11
10	36	1.00
12	30	.84
15	24	.67
20	18	.50
30	12	.39
40	9	.25
60	6	.20

<sup>1</sup> Costs calculated at 10 percent of average inventory value.

With a turnover of twice a year, inventories will cost \$5 per \$100 of sales. If the turnover is 20 times a year, inventories will cost 50 cents per

\$100 of sales. With a turnover of 6, which is about the rate of the associations in this study, inventory costs will amount to \$1.68 per \$100 of sales.

## Warehouse and Display Areas

Four managers considered their business locations inadequate because of lack of land for present site expansion and congested traffic flow.

At 6 associations existing facilities were considered inadequate for present volumes, and at 2 other associations facilities were adequate except for seasonal storage of ferti-

lizer. Three associations had building programs underway to provide more storage and display space.

Additional space was considered necessary (1) to get the advantages of bulk buying, (2) to save labor by not stacking supplies so high, and (3) to provide better control of inventory by making stock easier to observe. Insuf-

efficient space had restricted inventories and improved inventory turnover at a sacrifice in total volume.

Warehouse space for the five associations with the smallest storage area averaged about 1,800 square feet. The area for the five associations with the most warehouse space averaged about 13,000 square feet.

Average volume of sales per square foot of warehouse area was \$157 for those with the smallest space compared to \$42 for the five associations with the largest storage facilities. Turnover averaged 5.9 times in 1955-56 for the five associations with smallest storage areas compared to 4.7 times for those with the largest warehouse areas.

## **Assistance by Regional Cooperatives**

Representatives of 16 local associations gave fieldmen of regional wholesale cooperatives credit for contributing to better understanding and control of inventory. Specific contributions included (1) assistance in advertising, display, and selling techniques, (2) suggestions on fast-moving items, and aid in moving "slow" items, and (3) recommendations on new items to stock. Display

and selling services were the benefits most often mentioned.

Three managers commended regional fieldmen for not attempting to oversell them, while one association representative reported an opposite view. Another manager objected to preseason selling programs of regional cooperatives because of added capital requirements, risks of price declines, and physical losses.

## **Area Comparisons**

Table 7 shows measures of inventory operations for three areas in which inventory studies have been made to date. These are not entirely comparable, however, because data

were not available for sales and inventories of identical groups of commodities and for inventories at the same time or frequency during the year. (See footnotes to table 7.)



Table 7--Measures of inventory operations in retail farm supply cooperatives in three areas of the United States<sup>1</sup>

Item	Area		
	I <sup>2</sup>	II <sup>3</sup>	III <sup>4</sup>
<u>For 5-year period studied<sup>5</sup></u>		<i>Percent</i>	
Increase in farm supply sales	12	20	30
Increase in farm supply inventories	12	12	28
<u>For last year of study<sup>5</sup></u>			
Percent of total assets in inventories at end of year	18	26	20
Inventory turnovers <sup>2 3 4</sup>		<i>Times per year</i>	
Feed	20	( <sup>6</sup> )	12
Seed	8	( <sup>6</sup> )	12
Fertilizer	23	33	4
Petroleum	23	41	15
Building supplies	4	( <sup>6</sup> )	( <sup>6</sup> )
Farm machinery	3	1	( <sup>6</sup> )
Tires, batteries, accessories	( <sup>6</sup> )	4	2
Hardware	( <sup>6</sup> )	3	( <sup>6</sup> )
Other supplies <sup>7</sup>	6	5	2
Total	11.4	9.0	6.1
Associations in each study		<i>Number</i>	
		9	20

<sup>1</sup> States in each area are as follows:

Area I--Indiana, Ohio, Michigan, and Pennsylvania.

Area II--Washington, Oregon, Idaho, and Utah.

Area III--Wisconsin, Minnesota, North Dakota, South Dakota, and northern Iowa.

<sup>2</sup> Area I turnovers are based on annual sales and average quarterly inventories.

<sup>3</sup> Area II turnovers for individual commodities are based on total sales and average monthly inventories for five associations. Data on cost of sales and year-end inventories resulted in an inventory turnover on total supplies of 6.2 times for 9 associations in 1956.

<sup>4</sup> Area III turnovers for individual commodities are based on cost of goods sold and year-end inventories. On the basis of sales, the total inventory of all supplies turned 7.7 times in 1956.

<sup>5</sup> Period covered in Areas I and II was for fiscal years 1952-56. Period covered in Area III was for calendar years 1952-56.

<sup>6</sup> Data were not available; included in "other supplies."

<sup>7</sup> Items in this group are not comparable in each area.



